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(51) INT CL<sup>6</sup>

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**H4K KFH**

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(56) Documents Cited

**EP 0508563 A1**

**US 4489310 A**

**US 4454501 A**

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**UK CL (Edition O ) G4H HKC HKK HKV, H4K KFH**

**INT CL<sup>6</sup> H03M, H04M**

**(54) Key function setting method using dual colour light emitting diode**

**(57) A method of operating an electrical apparatus having dual function keys and a dual coloured LED is disclosed. When a function key is operated, whether the key is used as a dual function key is determined. If the key is used as a dual function key, whether the key is operated as an upper or a lower key is determined. If the key is operated as an upper key, the service for the corresponding upper key function is rendered and the dual coloured LED driven as a green LED. If the key is operated as a lower key, the service for the corresponding lower key function is rendered and the dual coloured LED driven as a red LED.**

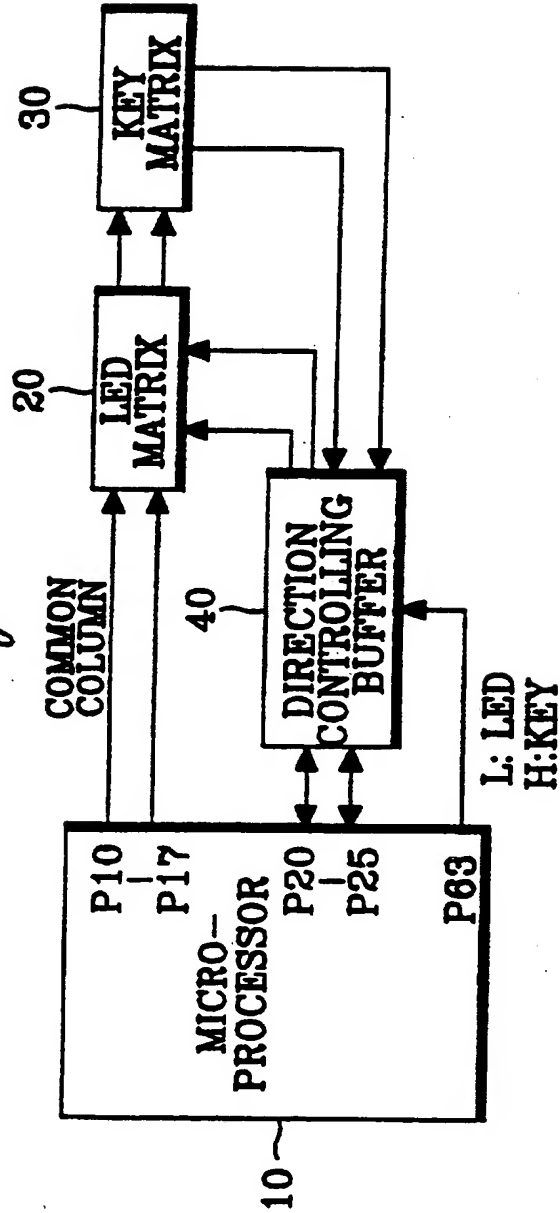
At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

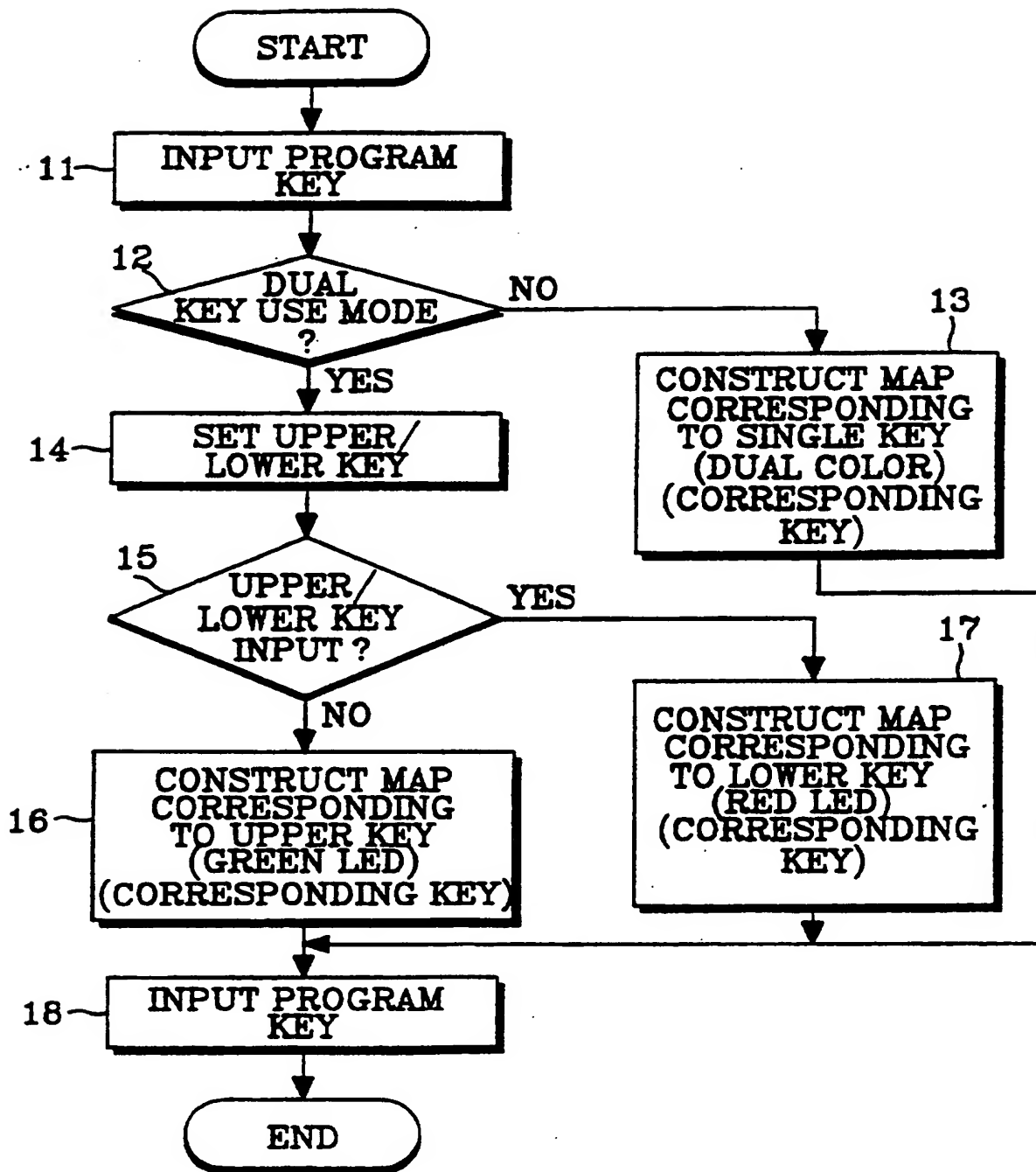
This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

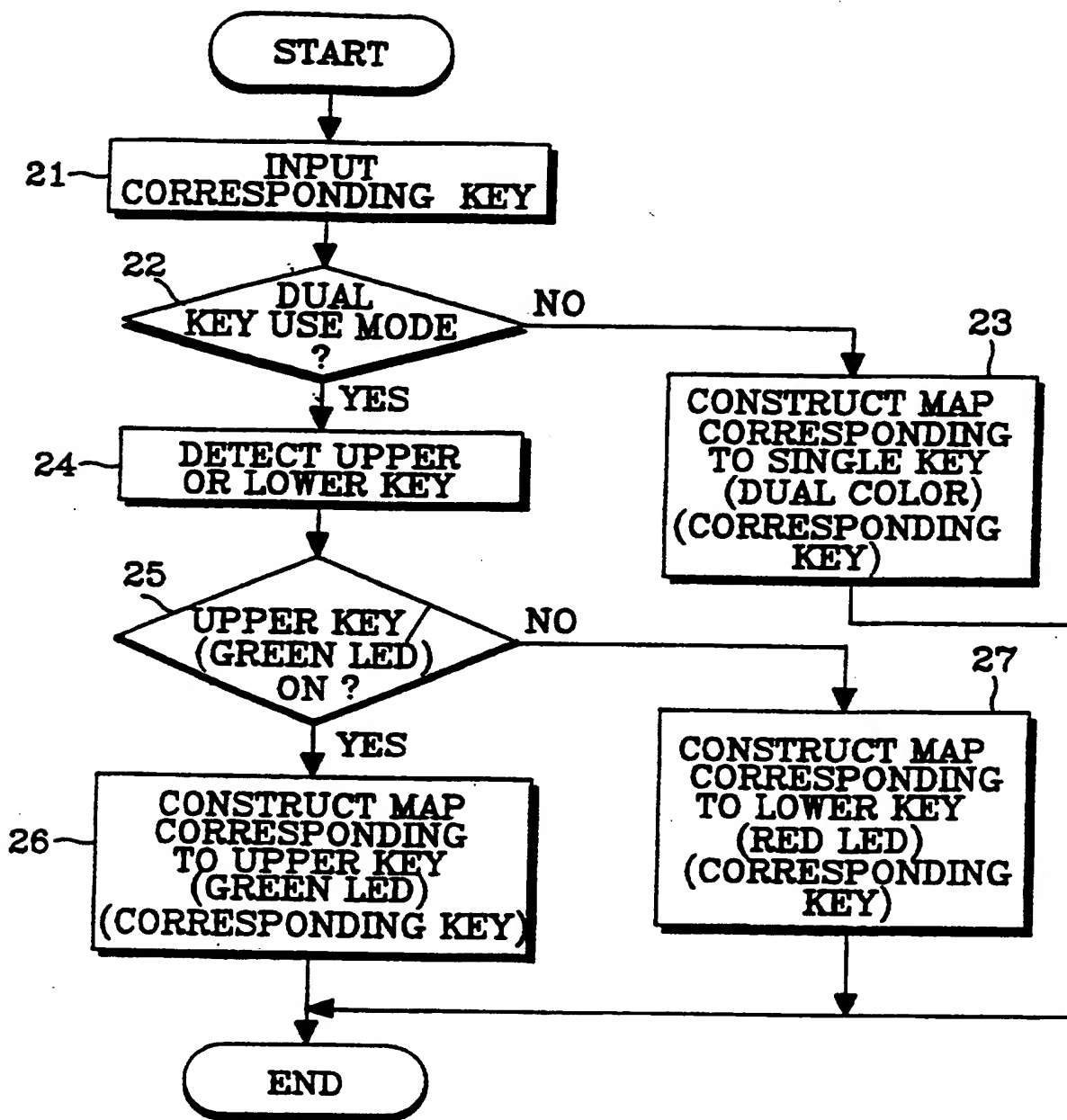
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STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1
EXTENSION LINE 1	EXTENSION LINE 2	EXTENSION LINE 3	EXTENSION LINE 4	EXTENSION LINE 5	EXTENSION LINE 6	EXTENSION LINE 12
EXTENSION LINE 7	EXTENSION LINE 8	EXTENSION LINE 9	EXTENSION LINE 10	EXTENSION LINE 11	EXTENSION LINE 12	
CONF	FLASH	LNR	BROAD-CASTING	SPD00	SPD01	

Fig. 1



*Fig. 3*

*Fig. 4*

STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1	STATION LINE 1
EXTENSION LINE 1	EXTENSION LINE 2	EXTENSION LINE 8	EXTENSION LINE 3	EXTENSION LINE 4	EXTENSION LINE 5	EXTENSION LINE 6
EXTENSION LINE 7	EXTENSION LINE 8	EXTENSION LINE 9	EXTENSION LINE 9	EXTENSION LINE 10	EXTENSION LINE 11	EXTENSION LINE 12
CONF	FLASH	LNR	BROAD - CASTING	PICKUP	UPPER	

(5A)

STATION LINE 7	STATION LINE 8	STATION LINE 9	STATION LINE 10	STATION LINE 11	STATION LINE 12	STATION LINE 12
EXTENSION LINE 13	EXTENSION LINE 14	EXTENSION LINE 15	EXTENSION LINE 16	EXTENSION LINE 17	EXTENSION LINE 18	EXTENSION LINE 18
EXTENSION LINE 19	EXTENSION LINE 20	EXTENSION LINE 21	EXTENSION LINE 22	EXTENSION LINE 23	EXTENSION LINE 24	EXTENSION LINE 24
EXTENSION LINE 25	EXTENSION LINE 26	EXTENSION LINE 27	EXTENSION LINE 28	EXTENSION LINE 29	LOWER	

(5B)

Fig. 5

KEY FUNCTION SETTING METHOD USING DUAL  
COLOUR LIGHT EMITTING DIODE

5 In general, in an apparatus for transmitting audio and/or data in a bi-directional way such as a key-phone system or a facsimile, control signals are generated by pressing keys. In addition, the key control state is displayed using light emitting elements, e.g. LEDs.

10

In a conventional key-phone system, a single LED corresponding to a key is used so that a one-chip microcomputer, the key matrix and the LED are connected as shown in FIG. 1. Thus, there are limitations in the number  
15 of keys used and the LEDs. Also, the controller or control program must be amended depending on the number of keys and LEDs used.

It is an object of the present invention to provide an  
20 improved key function setting method.

To accomplish this and other objects, there is provided a method of operating an electrical apparatus having dual function keys and a dual coloured LED comprising:

25 when a dual function key is operated, detecting whether the key is operated as an upper or a lower key;

if the key is operated as an upper key, rendering service for the corresponding upper key function and driving the dual coloured LED as a first colour; and

30 if the key is operated as a lower key, rendering service for the corresponding lower key function and driving the dual coloured LED as a second colour.

The present invention also provides a method of operating  
35 an electrical apparatus having dual function keys and a dual coloured LED comprising:

when a function key is operated, detecting whether the key is used as a dual function key;

if the key is used as a dual function key, detecting

whether the key is operated as an upper or a lower key;

if the key is operated as an upper key, rendering service for the corresponding upper key function and driving the dual coloured LED as a first colour; and

5 if the key is operated as a lower key, rendering service for the corresponding lower key function and driving the dual coloured LED as a second colour.

The present invention further provides a method of  
10 operating an electrical apparatus having dual function keys and a dual coloured LED comprising:

when a function key is operated, detecting whether a dual key use mode is set;

if the dual key use mode is set, detecting whether the  
15 key is operated as an upper or a lower key;

if the key is operated as an upper key, rendering service for the corresponding upper key function and driving the dual coloured LED as a first colour; and

if the key is operated as a lower key, rendering  
20 service for the corresponding lower key function and driving the dual coloured LED as a second colour.

The method may further comprise:

rendering service for the corresponding single key  
25 function if the dual key use mode is not set.

The first and second colours may be green and red. The electrical apparatus may be a key-phone.

30 A more complete appreciation of this invention, and many of its attendant advantages, will be readily apparent as the same becomes better understood by reference to the following detailed description of a preferred embodiment when considered in conjunction with the accompanying  
35 drawings in which:

FIG. 1 shows a conventional single key function;

FIG. 2 is a block diagram showing a dynamic controlling method for controlling an LED and keys of a key-phone system according to the present invention;

FIG. 3 is a controlling flow chart for registering corresponding functions using the keys and LED according to the present invention;

FIG. 4 is a controlling flow chart for rendering key services according to the present invention; and

FIG. 5 shows an upper or lower key function using a dual key according to the present invention.

Referring to FIG. 2, there are provided an LED matrix 20 and key matrix 30 for controlling an LED and keys, respectively. Eight ports P10 through P17 of a microprocessor 10 are continually used as output ports of a scanning signal during the control of the LED and are connected to the respective matrices by common row connections.

Another six ports P20 through P25 of the microprocessor 10 are used as output ports and are connected to rows of the LED matrix 20 during the LED control, and are used as input ports and are connected to rows of the key matrix 30 during key input. The remaining port P63 of the microprocessor 10 controls the input and output state of a direction controlling buffer 40.

First, the key controlling method will be described. To check a key input, one column among eight common columns is selected to be a "H" state. The remaining columns are all output as an "L" state. Then, the states of the rows are read through the ports P20 through P25. For this purpose, the ports P20 through P25 are in an input mode, so that the port P0 is output as "H" to convert the direction controlling buffer 40 into input mode. One column among 8 common columns is selected for about 20 $\mu$ sec of a 2ms cycle to read the corresponding key row. The next column is selected in the next cycle. This process is repeated eight times. After the first column is selected, the interval before selecting the next first column is 16msec. To prevent malfunction of key manipulation, a key scanning counter is set to 2, so that the required key scanning time



ranges from 18msec to 32msec.

Next, the LED controlling method will be described. The LED matrix 20 is composed of eight columns P10 through P17 and eight rows, commonly used with keys. One of eight columns is selected to be "L" and the remaining columns are output as "H". Then, the outputs of the rows are written to illuminate the LEDs.

10 A preferred embodiment of the present invention will now be described in detail with reference to FIGs. 2 through 5.

First, the process of setting two functions for a key using a dual coloured LED by means an input program key will be described with reference to FIG. 3. If a program key is operated at a key input unit in step 11, a microprocessor 10 proceeds to step 12 to check whether a dual key is used. If a dual key is not used, the process proceeds to step 13. In step 13, microprocessor 10 is set to the corresponding function in a map corresponding to a single key. However, if a dual key is used, either an upper or lower key is operated. In step 15, it is detected whether the input key is the upper or lower key. If the upper key is operated, the process proceeds to step 16 to construct a map shown in FIG. 5A so that the LED is driven as a green LED. However, if the lower key is input, the process proceeds to step 17 to construct a map shown in FIG. 5B so that the LED is driven as a red LED. Then, if a program key is input in step 18, the registering operation is terminated.

30

The function corresponding to the input key and the LED displaying operation are shown in FIG. 4, if the corresponding key is input depending on the selection of an upper or lower key. In step 21, if a key signal is input from a key input unit (not shown), the microprocessor 10 recognizes the key input. At this time, in step 22, it is checked whether the dual key use mode is set. If the dual key use mode is not set, the process proceeds to step 23. In step 23, the microprocessor 10 performs the LED and

function services depending on the corresponding key input in such a map as shown in FIG. 1. However, if the dual key use mode is set, the process proceeds to step 24 to detect whether an upper or lower key is set. In step 25, it is  
5 checked whether the upper key is set. If it is, the process proceeds to step 25 to render the function service corresponding to a key constructed in such a map as shown in FIG. 5A and drive the green LED. However, in step 25, if the upper key is not set but the lower key is set, the  
10 process proceeds to step 27 to render the function service corresponding to a key constructed in such a map as shown in FIG. 5B and drive the red LED.

As described above, according to the present invention, a  
15 separate upper or lower key is set by using a DSS key of with dual coloured LED, thus efficiently providing many more functions without increasing the number of keys and LEDs.

**CLAIMS:**

1. A method of operating an electrical apparatus having dual function keys and a dual coloured LED comprising:
  - 5 when a dual function key is operated, detecting whether the key is operated as an upper or a lower key;
    - if the key is operated as an upper key, rendering service for the corresponding upper key function and driving the dual coloured LED as a first colour; and
    - 10 if the key is operated as a lower key, rendering service for the corresponding lower key function and driving the dual coloured LED as a second colour.
2. A method of operating an electrical apparatus having dual function keys and a dual coloured LED comprising:
  - 15 when a function key is operated, detecting whether the key is used as a dual function key;
    - if the key is used as a dual function key, detecting whether the key is operated as an upper or a lower key;
    - 20 if the key is operated as an upper key, rendering service for the corresponding upper key function and driving the dual coloured LED as a first colour; and
    - if the key is operated as a lower key, rendering service for the corresponding lower key function and
    - 25 driving the dual coloured LED as a second colour.
3. A method of operating an electrical apparatus having dual function keys and a dual coloured LED comprising:
  - 30 when a function key is operated, detecting whether a dual key use mode is set;
    - if the dual key use mode is set, detecting whether the key is operated as an upper or a lower key;
    - if the key is operated as an upper key, rendering service for the corresponding upper key function and
    - 35 driving the dual coloured LED as a first colour; and
    - if the key is operated as a lower key, rendering service for the corresponding lower key function and driving the dual coloured LED as a second colour.

4. A method according to claim 3 further comprising:  
rendering service for the corresponding single key  
function if the dual key use mode is not set.

5 5. A method according to any preceding claim in which the  
first colour is green.

6. A method according to any preceding claim in which the  
second colour is red.

10

7. A method according to any preceding claim in which the  
electrical apparatus is a key-phone.

8. A method of operating an electrical apparatus having  
15 dual function keys and a dual coloured LED substantially as  
described herein with reference to FIGS 2-5 of the  
accompanying drawings.



Application No: GB 9613444.0  
Claims searched: 1-8

Examiner: Mike Davis  
Date of search: 2 August 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G4H (HKK,HKC,HKV), H4K (KFH)

Int Cl (Ed.6): H03M, H04M

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0508563 A1 (NOKIA) whole document	1-8
X	US 4489310 (TROSTYANETSKY) eg abstract	1-8
X	US 4454501 (BUTTS) eg col.2 lines 31-38,48-59, col.3 lines 31-36	1-8

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Documents published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.